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Claims: -

1. A digital subscriber line (DSL) modem comprising a line interface transformer having a primary circuit for coupling to a transmission line and a secondary circuit for outputting a signal transmitted over said transmission line, each
5 circuit being formed of a continuous electrically conductive material and in which the primary circuit defines a first plane and the secondary circuit defines a second plane, said first and second planes substantially parallel to one another.
2. A DSL modem as claimed in claim 1, wherein said first plane is spaced-apart from said second plane.
- 10 3. A DSL modem as claimed in claim 1 or 2, wherein said line interface transformer comprises alternating layers of said primary circuit and said secondary circuit.
4. A DSL modem as claimed in claim 1, 2 or 3, wherein there are a plurality of first and second planes each plane forming a layer and wherein said primary circuit
15 comprises a plurality of substantially parallel layers and said secondary circuit comprises a plurality of substantially parallel layers.
5. A DSL modem as claimed in claim 4, layers of said primary circuit adjacent one another and layers of said secondary circuit adjacent one another, said primary and secondary circuits separated by a gap.
- 20 6. A DSL modem as claimed in claim 5, wherein said primary circuit layers form a primary circuit stack and said secondary circuit layers form a secondary circuit stack, said primary circuit stack and said secondary circuit stacked one adjacent the other.
7. A DSL modem as claimed in claim 3 or 4, wherein layers of said primary
25 circuit are interleaved with layers of said secondary circuit.
8. A DSL modem as claimed in any of claims 4 to 7, wherein the separation between said layers is not more than 0.5mm.
9. A DSL modem as claimed in any of claims 4 to 8, wherein layers of said primary circuit are connected in series or parallel.
- 30 10. A DSL modem as claimed in any of claims 4 to 9, wherein layers of said secondary circuit are connected in series or parallel.
11. A DSL modem as claimed in any of claims 4 to 10, further comprising at least ten layers of said plurality of substantially parallel layers of said primary circuit, and at least ten layers of said plurality of substantially parallel layers of said secondary

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circuit.

12. A DSL modem as claimed in any preceding claim, wherein a number of turns of each circuit is at least ten.

13. A DSL modem as claimed in any preceding claim, further comprising
5 damping means for damping resonance in said secondary circuit.

14. A DSL modem as claimed in claim 13, wherein said damping means is positioned on one side of said line interface transformer.

15. A DSL modem as claimed in claim 13 or 14, wherein said damping means is positioned on both sides of said line interface transformer.

10 16. A DSL modem as claimed in claim 13, 14 or 15, wherein said damping means is positioned in between said primary and secondary circuits.

17. A DSL modem as claimed in claim 13, 14, 15 or 16, wherein said damping means comprises a metal.

15 18. A DSL modem as claimed in claim 17, wherein said damping means comprises a plate or foil.

19. A DSL modem as claimed in any preceding claim, wherein said primary circuit and said secondary circuit are in the form substantially parallel spirals of the conductive material defining substantially different planes.

20 20. A DSL modem as claimed in claim 19, wherein the spiral is substantially circular, elliptical, square, rectangular, oval or non-regular.

21. A DSL modem as claimed in claims 19 or 20 in which the spiral conforms substantially to a spiral formed by the polar equation $r(\theta) = \alpha\theta$, where θ is the angle in polar coordinates, r is the radius and α is a constant that regulates the number of turns and the spacing.

25 22. A DSL modem as claimed in any preceding claim, having an aspect ratio defined as diameter to width of 1:5 or more.

23. A DSL modem as claimed in any preceding claim, wherein said line interface transformer does not comprise ferromagnetic core.

30 24. For use in a DSL modem, a line interface transformer having any of the line interface transformer features of any preceding claim.

25. A method of transmitting electronic data over a transmission line, which method comprises the steps of placing said electronic data on said transmission line using a line interface transformer as claimed in claim 24.

26. A method of manufacturing DSL modem, which method comprises the step

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of a inserting a line interface transformer according to claim 24 and electrically connecting said transformer thereto.

27. A coreless transformer for passing a low frequency band digital data signal between about 10kHz and 20MHz, which transformer comprises a primary circuit and a secondary circuit having a number of turns such that said transformer comprises a plurality of layers, each layer having all primary or all secondary conductors, there being a combination of said number of turns and a number layers sufficient to obtain a transformer action for passing said digital data signal from said primary circuit to said secondary circuit over said frequency band.

28. A coreless transformer as claimed in claim 27, wherein said layer extends radially outwardly from a centre of said transformer.

29. A coreless transformer as claimed in claim 27 or 28, wherein layers of said primary circuit are adjacent one another to form a primary circuit stack, and layers of said secondary circuit are adjacent one another to form a secondary circuit stack, the arrangement being such that said primary circuit stack and said secondary circuit stack are stacked one next to the other to facilitate said transformer action.

30. A coreless transformer as claimed in claim 27 or 28, wherein layers of said primary circuit are interleaved with layers of said secondary circuit, the arrangement being such that there are alternating layers of said primary and secondary circuits.

31. A coreless transformer as claimed in claim 30, wherein said alternating layers comprise single layers of said primary and secondary circuits.

32. A coreless transformer as claimed in any of claims 27 to 31, wherein a separation between conductors in each layer is between about 0.02mm and 0.075mm.

33. A coreless transformer as claimed in any of claims 27 to 32, wherein the separation between each layers is between about 0.02mm and 0.2mm.

34. A coreless transformer as claimed in any of claims 27 to 33 wherein there are at least ten layers.

35. An electrical circuit comprising a coreless transformer according to any of claims 27 to 34.

36. A DSL modem comprising an electrical circuit as claimed in claim 35.